



Accident Investigations – Ammonia and Chlorine Releases

Presentation to County of San Diego Department of Public Health

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U.S. Chemical Safety Board

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Disclaimer

The PowerPoint presentation given by John Bresland, Board Member, the United States Chemical Safety and Hazard Investigation Board to the San Diego County Department of Public Health is for general informational purposes only. The presentation represents the individual views of the Board Member and all references, conclusions or other statements regarding current ongoing CSB investigations are preliminary in nature and do not represent a formal adopted product of the Board. Users of this presentation should also note that the contents were compiled solely for this presentation. For specific and accurate information on completed investigations, please refer to the final printed version by going to the CSB website at www.csb.gov and clicking on the specific report desired under completed investigations

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What I'm Going to Talk About

- What is the Chemical Safety Board?
- The CSB's investigations
- Chlorine and ammonia incidents
- Lessons learned from CSB investigations

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The U.S. Chemical Safety Board

- Authorized by the 1990 U.S. Clean Air Act
- **Non-regulatory** federal agency
- Offices in Washington, DC and Denver, CO
- Budget \$11.1M in FY 2012
- Five Board members – two vacancies
- Staff – 46

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CSB BOARD MEMBERS



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Bresland



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Chairman



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What does the CSB do?

- We investigate chemical process incidents
- We determine root causes
- We make **recommendations**

Our goal is prevention.

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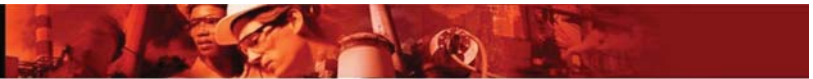
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The CSB's Product

- Recommendations

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The CSB's Goal

Recommendations that
make a difference

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Recommendations that made a difference

- Modifying the API industry standard for temporary structures
- Triggering a wholesale modernization of the NYC Fire Code
- Enhancing the process safety component of chemical engineering education required for accreditation of university programs

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How do we decide which incidents to investigate?

- Death or injury to a member of the public
- Death or injury to an employee
- Public evacuation or shelter-in-place
- Property loss outside
- Property loss inside
- Ecosystem damage
- Facility history

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Recently completed investigations

- Phosgene fatality at DuPont, Belle, West Virginia
- Public Safety at Oil and Gas Storage Facilities
- Academic Laboratory Incidents
- Metal dust fires and fatalities, Hoeganaes Corp., Gallatin, TN

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DuPont Belle, West Virginia

Phosgene fatality

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Academic Laboratory Incidents

Texas Tech

UCLA

Dartmouth



Texas Tech University



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Current Major Investigations

- Gulf of Mexico oil rig explosion and fire
- Tesoro refinery explosion – 7 fatalities
- Citgo hydrogen fluoride release and fire
- DuPont – hot work fatality



Current Major Investigations

- San Juan PR oil terminal fire and explosion
- Donaldson Enterprises, Honolulu, fireworks explosion

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Tesoro refinery – Anacortes, Washington



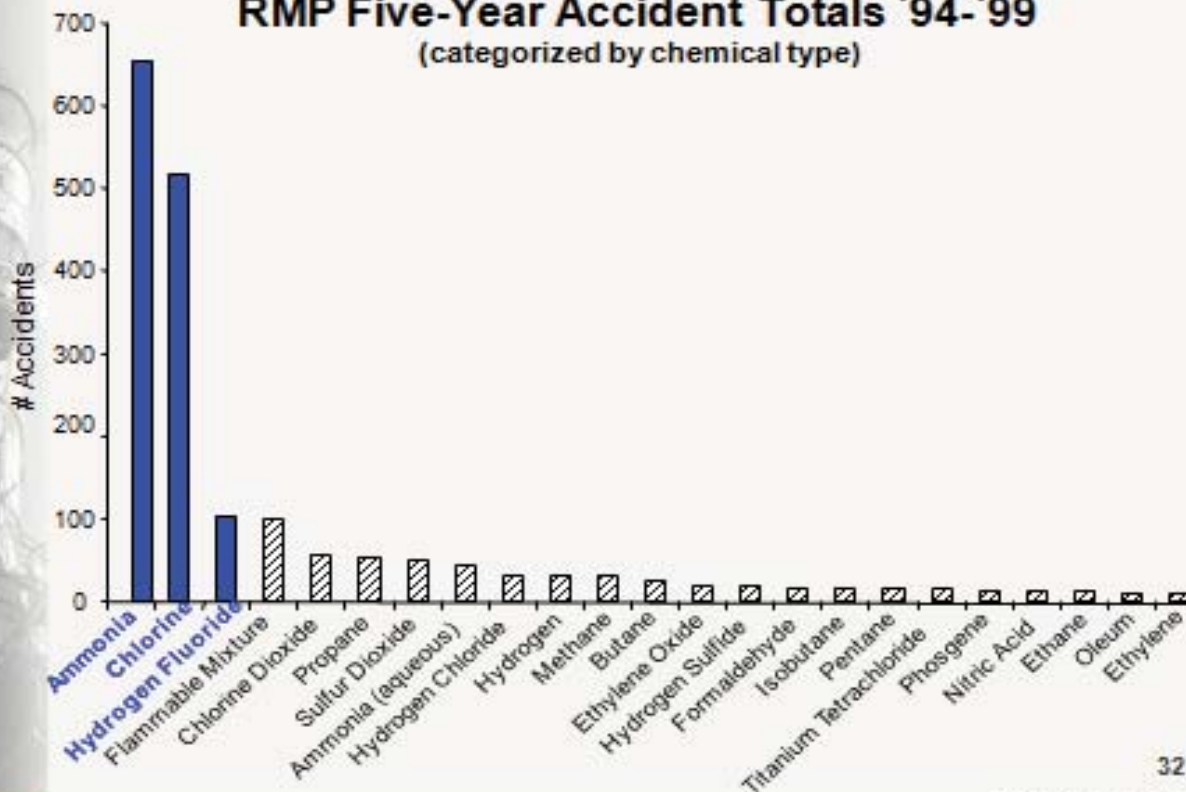
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Chlorine incidents



RMP Five-Year Accident Totals '94-'99 (categorized by chemical type)



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CSB Chlorine Incidents

Date	Company	City	Number of Affected Individuals
1/16/2011	Foss Swim School	St. Louis Park, MN	7
1/21/2011	Southern Metals Recycling	Savannah, GA	4
1/27/2011	Dow Chemical	Midland, MI	0
2/27/2011	Guam Waterworks Authority	Tamuning, GU	0
2/27/2011	Quincy Water Pollution Control Facility	Quincy, IL	0
3/1/2011	DuPont Belle facility	Belle, WV	0
3/2/2011	Archer Daniels Midland Co.	Lincoln, NE	8
3/22/2011	Specialty Chemical Co.	Cleveland, OH	0
4/6/2011	PPG Industries	Westlake, LA	0
4/6/2011	Charlotte Industry Building	Charlotte, NC	0
4/18/2011	Columbia Waste Water Treatment Plant	Columbia, SC	0
5/4/2011	Shelby County Waste Water Treatment	Shelby, NC	0
6/7/2011	DuPont LaPlace	LaPlace, LA	1
6/7/2011	Mount Olympus Water Park	Green Bay, WI	15
6/11/2011	Signla Bay Waterpark	Manassas, VA	6
6/15/2011	Battelle Memorial Institute	Columbus, OH	0
6/21/2012	Richmond, IN Sanitary District	Richmond, IN	2



CSB Chlorine Incidents

Date	Company	City	Number of Affected Individuals
7/26/2011	Lansing Board of Water & Light	Lansing, MI	2
7/31/2011	Pinch-a-Penny Pool Supplie	North Fort Myers, FL	2
8/2/2011	Stewart Creek Wastewater Treatment	The Colony, TX	1
8/2/2011	Crystal Hot Springs, UT Community Pool	Crystal Hot Springs, UT	9
8/15/2011	Raging Waters Amusement Park	Sacramento, CA	20
8/21/2011	Pacific Coast Producers	Woodland, CA	43
8/21/2011	El Paso Water Utlities	El Paso, TX	1
.0/11/2011	The Hygenic Corporation	Akron, OH	1
.0/25/2011	Honeywell International	Geismar, LA	1
.0/28/2011	Jefferson City Water Facility	East Jefferson, TN	2
11/2/2011	Okeechobee Drum Service Plaza	Okeechobee, FL	1
11/3/2011	Dover Chemicals	Dover, OH	3
.1/16/2011	New Page Corporation / Luke Paper Co.	Luke, MD	4

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Hazard Investigation Board



CSB Chlorine Incident Investigations

- DPC, Festus, Missouri, August, 2002
- DPC, Glendale, AZ -- November, 2003
- Honeywell, Baton Rouge, July 2003



DPC Chlorine Video

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Lessons learned – chlorine incidents

- Emergency response
- Mechanical integrity
- Shutdown systems
- Positive material identification

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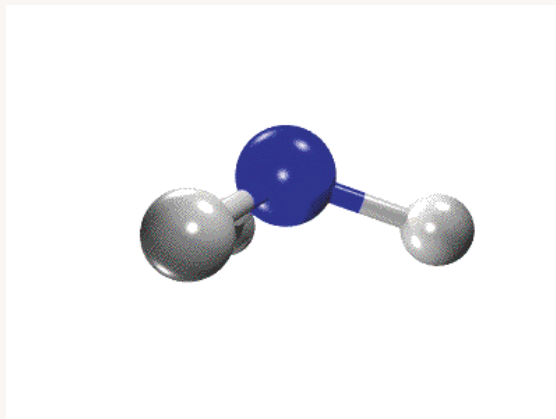
Ammonia incidents

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AMMONIA



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Ammonia Production

- **World- wide: Approximately 140 million tons per year**
- **U.S: Approximately 10 million tons per year, down from 16 million tons in 1994**

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Ammonia Uses

80% agricultural

18% industrial

2% refrigerant

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Ammonia incidents

Huntsman Corp	Port Neches, TX	100 lbs
Valero	Delaware City, DE	unk
Coch Nitrogen	Beatrice, NE	unk
Coffeyville Resources	Coffeyville, KS	350 lbs
Coffeyville Resources	Coffeyville, KS	100 lbs
Exxon Mobil	Baytown, TX	100 lbs
United Farmers Co-op	Utica, NE	75 lbs
Leprino Foods	Lemoore, CA	unk
Tyson Foods	Saguin, TX	unk
Conoco Phillips	Old Ocean, TX	2561 lb
Exxon Mobil Refinery and Supply	Baytown, TX	91 lbs
Con Agra Foods	Twin Falls, ID	unk
Enterprise Products Operating LP	Haviland, KS	21 gal
Tyson Foods	Seguin, TX	unk
Atz Ice Cream	Kendalville, IN	unk
Angus Chemical	Sterlington, LA	1496 lb
Con Agra Foods	Twin Falls, ID	unk
Butterball LLC	Huntsville, AR	unk
Crop Production Services	Orange Township, IL	800 lb
Robert Bowman	Dewitt, IA	unk
JR Simplot	Caldwell, ID	unk
Farm Fertilizer Co.	Buckingham, IA	1000 lb
Tyson Foods	Saguin, TX	unk
Tyson Foods	North Little Rock, AR	110 ppm
Coca Cola	Honolulu, HI	unk

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Ammonia incidents (2)

Valero	Delaware City, DE	unk
unk	Bayou La Batre, AL	80 lb
Pork processing plant	Pleasant Hope, MO	unk
Coffeyville Resources	Coffeyville, KS	100 lb
Premium Standard Farms	Milan, MO	unk
Conoco/Phillips	Borger, TX	100 lb
Belanese LTD	Pasadena, TX	100 lb
Tyson Foods	Sherman, TX	unk
Enterprise Products Operating LP	Oregon, OK	34 gal
Invista	Victoria, TX	100 lbs
Rousseau Farming Co	Tolleson, AZ	unk
Koch Nitrogen	Enid, OK	100 lbs
Magellan Enterprises	Greenwood, NE	3.52 barrels
Cargill Meat Solutions	Beardstown, IL	unk
Dole Package Foods	Atwater, CA	unk
Tyson Foods	Forest, MS	unk
Tyson Mexican Original	Portland, IN	unk
Bama Foods	Tulsa, OK	unk
Coca Cola	Elmsford, NY	400 lb
Tyson Prepared Foods	Hutchinson, KS	unk
Coca Cola	Silver Spring, MD	20 lb
New Cooperative Inc.	Mooreland, IA	unk
Pier Fish Co.	New Bedford, MA	unk
Kellogg's	Zanesville, OH	unk
Dyno Nobel	Battle Mountain, NV	unk

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Ammonia incidents (3)

Coca Cola	San Leandro, CA	8 oz.
unknown	Rushville, IL	unk
Tyson Foods	Harrisonburg, VA	100 lb
Townsend Processing Plant	Bakesville, AR	unk
U.S. Cold Storage	Arlington, TX	unk
Coffeyville Resources	Coffeyville, KS	unk
Praxair	Ferndale, WA	180 lbs
Helena Chemical	Marshall, MN	700 lbs
Southwest Landmark	S. Charleston, OH	unk
Southern States Coop	Calhoun, KY	unk
Tyson Foods	Saguin, TX	150 lbs
Hiland Dairy Foods	Fayetteville, AR	unk
Tyson Foods	Saguin, TX	unk
Pilgrims Pride Corp	Mt. Pleasant, TX	unk
JR Simplot	Othello, WA	unk
Miller Brewing Co.	Ft. Worth, TX	175 lb
Miller Brewing Co.	Eden, NC	754 lb
Stanford Refrigerated Warehouse	Macon, GA	unk
Exxon Mobil	Beaumont, TX	907 lb
Tyson Foods	Omaha, NE	unk
JR Simplot	Lathrop, CA	315 lb
Perdue Farms	Accomack, VA	40 lb
Cytec Industries	Waggaman, LA	unk
Coffeyville Resources	Coffeyville, KS	100 lbs

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... from 11/15 to 12/31/2006

11/16/2006	Huntsman Corp	Port Neches, TX	100 lbs			
11/18/2006	Valero	Delaware City, DE	unk			
11/18/2006	Coch Nitrogen	Beatrice, NE	unk			
11/19/2006	Coffeyville Resources	Coffeyville, KS	350 lbs			
11/20/2006	Coffeyville Resource	11/29/2006 Valero	Delaware City, DE	unk		
11/20/2006	Exxon Mobil	11/29/2006 unk	Bayou La Batre, AL	80 lb		
11/21/2006	United Farmers Co-	11/29/2006 Pork processing plant	Pleasant Hope, MO	unk		
11/21/2006	Leprino Foods	11/30/2006 Coffeyville Resources	Coffeyville, KS	100 lb		
11/21/2006	Tyson Foods	11/30/2006 Premium Standard P	12/14/2006 Coca Cola	San Leanero, CA	8 oz.	
11/21/2006	Conoco Phillips	11/30/2006 Conoco/Phillips	12/15/2006 unknown	Rushville, IL	unk	
11/22/2006	Exxon Mobil Refiner	12/1/2006 Belanese LTD	12/15/2006 Tyson Foods	Harrisonburg, VA	100 lb	
11/22/2006	Con Agra Foods	12/2/2006 Tyson Foods	12/15/2006 Townsend Processing Pl	Bakesville, AR	unk	
11/22/2006	Enterprise Products	12/2/2006 Enterprise Products	12/17/2006 U.S. Cold Storage	Arlington, TX	unk	
11/23/2006	Tyson Foods	12/3/2006 Invista	12/18/2006 Coffeyville Resources	Coffeyville, KS	unk	
11/23/2006	Atz Ice Cream	12/3/2006 Rousseau Farming	12/19/2006 Praxair	Ferndale, WA	180 lbs	
11/24/2006	Angus Chemical	12/4/2006 Koch Nitrogen	12/19/2006 Helena Chemical	Marshall, MN	700 lbs	
11/24/2006	Con Agra Foods	12/4/2006 Magellan Enterprise	12/19/2006 Southwest Landmark	S. Charleston, OH	unk	
11/26/2006	Butterball LLC	12/6/2006 Cargill Meat Solution	12/20/2006 Southern States Coop	Calhoun, KY	unk	
11/26/2006	Crop Production Ser	12/6/2006 Dole Package Food	12/20/2006 Tyson Foods	Saguin, TX	150 lbs	
11/26/2006	Robert Bowman	12/6/2006 Tyson Foods	12/21/2006 Hiland Dairy Foods	Fayetteville, AR	unk	
11/27/2006	JR Simplot	12/6/2006 Tyson Mexican Orig	12/21/2006 Tyson Foods	Saguin, TX	unk	
11/27/2006	Farm Fertilizer Co.	12/7/2006 Bama Foods	12/21/2006 Pilgrims Pride Corp	Mt. Pleasant, TX	unk	
11/27/2006	Tyson Foods	12/8/2006 Coca Cola	12/21/2006 JR Simplot	Othello, WA	unk	
11/27/2006	Tyson Foods	12/9/2006 Tyson Prepared Foo	12/21/2006 Miller Brewing Co.	Ft. Worth, TX	175 lb	
11/28/2006	Coca Cola	12/9/2006 Coca Cola	12/22/2006 Miller Brewing Co.	Eden, NC	754 lb	
		12/11/2006 New Cooperative Inc	12/24/2006 Stanford Refrigerated Wa	Macon, GA	unk	
		12/11/2006 Pier Fish Co.	12/27/2006 Exxon Mobil	Beaumont, TX	907 lb	
		12/11/2006 Kellogg's	12/27/2006 Tyson Foods	Omaha, NE	unk	
		12/13/2006 Dyno Nobel	12/27/2006 JR Simplot	Lathrop, CA	315 lb	
			12/28/2006 Perdue Farms	Accomack, VA	40 lb	
			12/28/2006 Cytec Industries	Waggaman, LA	unk	
			12/29/2006 Coffeyville Resources	Coffeyville, KS	100 lbs	

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CSB Ammonia Incidents 2011 – 2012 (1)

Date	Company	City	Number of Affected Individuals
1/5/2011	House of Raeford	Raeford, NC	0
1/6/2011	Tyson Foods	Dexter, MO	0
1/12/2011	Beef Tech	Heyburn, ID	0
1/16/2011	Conagra Foods	Council Bluffs, IA	0
1/18/2011	Koch Nitrogen Company	Enid, OK	0
1/25/2011	Cutrale Citrus Juices USA	Auburndale, FL	1
1/27/2011	Medimmune Distribution LLC	Shepherdsville, KY	0
2/2/2011	Ventura Foods	Ontario, CA	0
2/8/2011	Smithfield Packing	Landover, MD	0
2/10/2011	Ventura Foods	Ontario, CA	0
2/8/2011	Cree Inc	Durham, NC	2
2/16/2011	Wayne Farms LLC Decatur West	Decatur, AL	4
2/18/2011	Linde LLC	Enid, OK	1
2/22/2011	Coca Cola Bottling Co.	Mapuapnua, HI	2
3/11/2011	Michael's European Specialties	Hazleton, PA	0

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CSB Ammonia Incidents 2011 – 2012 (2)

Date	Company	City	Number of Affected Individuals
3/23/2011	JBS	Louisville, KY	0
3/25/2011	Southern Ice Cream Spec	Marietta, GA	0
3/31/2011	Pilgram's Pride	Gainesville, GA	0
4/2/2011	Mrs. Ressler's Food Products	Philadelphia, PA	2
4/13/2011	Freshpoint North Florida	Jacksonville, FL	0
4/15/2011	Americold Logistics	Norfolk, VA	2
4/19/2011	Unified Grocers	Seattle, WA	2
4/25/2011	Rainsville Shop	Rainsville, AL	1
4/30/2011	Tyson's Foods	Rogers, AR	0
5/20/2011	Polar Cold Storage	Nashville, TN	0
5/26/2011	Turner Dairy	Fulton, KY	1
5/31/2011	Cargill	Milwaukee, WI	0

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CSB Ammonia Incidents 2011 – 2012 (3)

Date	Company	City	Number of Affected Individuals
7/1/2011	Del Mar Cold Storage	Watsonville, CA	5
7/5/2011	Midway Cold Storage	St. Paul, MN	1
7/7/2011	Mount Aire Farms	Lumber Bridge, NC	1
7/21/2012	Silver Bay Seafoods	Sitka, AK	0
8/5/2011	Popaco	San Juan, PR	1
8/16/2011	Pilgram's Pride	Marshville, NC	0
8/22/2011	Pro Flowers	Charlotte, NC	0
8/30/2011	Champion Technologies	Fresno, TX	0
8/30/2011	Saint Gobain Abrasives Inc	Worcester, MA	1
9/2/2011	Koch Industries, Inc	Duncombe, IA	1
9/7/2011	Americold Logistics	Atlanta, GA	0

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CSB Ammonia Incidents 2011 – 2012 (4)

Date	Company	City	Number of Affected Individuals
10/3/2011	T&T Fertilizer	Goshen, TN	4
10/29/2011	Farmers Co-Op	Gowrie, IA	2
11/8/2011	Oscar Mayer	Madison, WI	0
11/14/2011	Bon Secour Fisheries	Bon Secour, AL	1
12/2/2011	Yuma Express Cooling	Yuma, AZ	12
12/3/2011	Pinnacle Foods	Fayetteville, AR	3
12/16/2011	Airgas Dry Ice	Torrance, CA	1
12/20/2011	Americold Logistics	Russellville, AR	1

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CSB Ammonia Incident Investigations

- Albany Freeze Dry, Albany, Oregon.
May 1998
- Goodyear, Houston, TX, June, 2008
- Millard Refrigeration, Theodore, AL,
August, 2010
- ConAgra, Garner, NC, June 2009

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CSB Ammonia Incident Investigations

- D.D. Williamson, Louisville, KY
April, 2003
- Tyson Foods, Hutchinson, KS,
Oct., 2006
- Tanner Industries, Swansea, SC
July, 2009

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Inspecting an ammonia facility

- Common failure causes – equipment failure and human error
- Mechanical integrity and maintenance
- Operator training
- Operating procedures



Emergency Response

- Is the emergency plan authentic and tested?
- Are all the requirements covered?
- What level of PPE will be used and is it available?
- What is the strategic goal for dealing with a release?

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Ammonia Emergency Response Video

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What I've learned at the Chemical Safety Board

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Facilities must focus on both:

Personnel Safety

and

Process Safety

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The OSHA PSM Standard

**It's an excellent basis for a strong
process safety program**

**It needs continuing resources and
support from management**

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Understand your hazards

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**Imperial Sugar Company Refinery, Port Wentworth, Georgia
February 7, 2008**



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